COURSE DESCRIPTION CARD - SYLLABUS

Course name

Industry 4.0

Course

Field of study

Mechatronics

Area of study (specialization)

Design and Control of Mechatronic Devices

Level of study

Second-cycle studies

Form of study

full-time

Year/Semester

1/2

Profile of study

general academic

Course offered in

Polish

Requirements

elective

Number of hours

Lecture

30

Laboratory classes

15

Other (e.g. online)

Tutorials

Projects/seminars

0

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

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Wydział Inżynierii Mechanicznej

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Responsible for the course/lecturer:

Prerequisites

The student should have basic knowledge in the field of automation, electronics, robotics, elements of

automation, drivers and computer networks. He should also have the ability to obtain information from the indicated sources and be ready to cooperate as part of the team.

Course objective

The student's acquisition of the ability to design, configure and implement selected elements of the so-called Industry 4.0, i.e. the Internet of Things (IoT), autonomous devices, automatic production control, predictive maintenance (PM), data exchange via the Internet, communication with the cloud, RFID, integrated driver units in automation.

Developing students' skills of practical implementation of Industry 4.0 solutions into practice.

Course-related learning outcomes

Knowledge

Knowledge of the mechanical components available on the market that can be used in mechatronic devices

Knowledge of electric motors and complete drives available on the market

Knowledge of the elements and complete measuring devices that can be used in mechatronic devices

Knowledge of control, communication and power supply modules used in mechatronic devices

Examples of construction of selected mechatronic devicess

Skills

1. Is able to design and program the system of the so-called Internet of Things (IoT)

2. Is able to select elements, including the driver, and design a simple standalone device

3. Can select system elements for predictive maintenance

4. Can program data exchange via the Internet and communication with the cloud

5. Is able to select the elements of the RFID system

6. Can use an integrated drive and control system

Social competences

1. Understands the need for lifelong learning; can inspire and organize the learning process of others

2. Can define priorities for the implementation of a specific task

3. Can interact and work in a group

4. Can think and act in an entrepreneurial manner

5. Is aware of the responsibility for his own work and readiness to submit to the principles of teamwork and responsibility for jointly performed tasks

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Laboratory: Credit based on the correct implementation of exercises and reports on each of them laboratory exercises according to the instructions of the laboratory teacher. Before the exercise short entry checks.

Credit for the lecture on the basis of a written test

Programme content

Lecture:

1. History of industrial revolutions. Elements of the so-called Industry 4.0
2. Challenges and benefits of the fourth industrial revolution
3. Internet of Things IoT (general news, construction, available platforms)
4. Internet of Things IoT (design, communication)
5. Autonomous devices, construction
6. Drivers of autonomous devices, programming
7. Integrated drives
8. Internet communication software. MQTT protocol
9. Advanced production systems
10. Production monitoring, automatic quality control.
11. Predictive Maintanance
12. RFID in control systems
13. Communication with the cloud and operations on the master server
14. Cloud computing
15. Application examples

Lab:

1. ZigBee Protocol
2. MQTT protocol
3. Humanoid robot controller

4. RFID and NFC

5. Database operations

6. Integrated power unit

7. Computer system for data acquisition and analysis

Teaching methods

Lecture: multimedia presentation and software application demonstration

Laboratory: Exercises performed by students in groups under the supervision of the teacher.

Bibliography

Basic

1. Kagermann, H., W. Wahlster and J. Helbig, eds., 2013: Recommendations for implementing the strategic initiative Industrie 4.0: Final report of the Industrie 4.0 Working Group.

2. Platforma Przemysłu Przyszłości –materiały Ministerstwa Przedsiębiorczości i Technologii.

Additional

1. Wsparcie dla przemysłu 4.0 w Polsce -materiały Ministerstwa Przedsiębiorczości iTechnologii

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,0
Classes requiring direct contact with the teacher	45	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	30	1,0

[1] delete or add other activities as appropriate